1.0 OBJECTIVE:

The objective of this project is to conduct a risk assessment for the Bound Brook and its associated stream corridor (wetlands and flood plains) adjacent to and downstream of the Cornell Dubilier Electronics site, located in South Plainfield, New Jersey. Abiotic (sediment, soil, and water) and biological samples (fish, frog, crayfish, and/or small mammals) will be collected, analyzed for chemical contaminants, and the results used to determine the risk to biota following a lines of evidence. The ecological risk assessment will be performed following the guidelines and procedures contained in the United States Environmental Protection Agency (U.S. EPA) The goal of the risk assessment is to establish the degree of the impact (chronic, acute, or imminent hazards) that are occurring to the system and if impacts are observed provide a protective ecological clean-up criteria.

2.0 PROJECT DESCRIPTION

2.1 Site Description

2.2 Scope of Work

This investigation will involve the collection and analysis of soil, sediment, water, and biota (fish, frogs, crayfish, and/or small mammals) from 6 to 8 sampling stations (along a PCB concentrations gradient) adjacent to and downstream of the Cornell Dubilier Electronics site. A reference station will be established either upstream of the site or in Spring Lake depending upon contaminant levels and/or matching habitat. Sample stations will be selected based upon a contaminant concentration gradient and similar habitat between sample stations, whenever possible. Contaminants of potential concern (COPCs) include target compound list (TCL) polychlorinated biphenyls (PCBs), TCL pesticides, target analyte list (TAL) metals, TCL semivolatiles [e.g., Polyaromatic Hydrocarbons (PAHs), Base, Neutral and Acid Extractable (BNA) compounds, creosotes] and TCL volatiles. Additional parameters including water quality, grain size, total organic carbon (TOC), and/or total petroleum hydrocarbon (TPH) may be collected and used to facilitate data interpretation. Additional sediment samples will be collected at four sample stations (including a reference location) for an amphipod (Hyallela azteca) chronic toxicity test and a amphibian embryo toxicity test. Should the collection of these samples not be feasible, the required data can be inferred from other available biota. The approach described in this work plan will be implemented in the field as close to as described as possible, but based on the site recomaissance it appears that not all of the species will be able to be collected from all sample stations. Preliminary sampling and biota collection will be used to further refine this work plan prior to the start of the field investigation and determine the downstream extent (up to New Market Pond) of the contamination.

Nine assessment endpoints were developed to evaluate the risk of contaminants in the Bound Brook and its associated stream corridor adjacent to and downstream of the Cornell Dubilier Electronics site. Each of the assessment endpoints were developed based on previous site data (including a preliminary risk assessment), a review of the toxicological profiles of the site contaminants, and the results of a site reconnaissance. Listed below is a general overview of the tests necessary to provide sufficient information to address the assessment endpoints. The measurement endpoints involve bioaccumulation and toxicity testing of site soil, sediment, and water, along with food chain modeling using receptor species from the terrestrial and aquatic ecosystems. The indicators of the viability of terrestrial and aquatic populations are reproductive effects and organism survival.

2.3 Contaminants of Potential Concern

Based on results of a preliminary risk assessment prepared by Region II U.S. EPA, the COPCs are PCBs, metals (arsenic, cadmium, lead, and zinc), and PAHs. These compounds were detected at elevated levels (exceeding ecological-based screening benchmarks) in sediments and soils on-site and in the Bound Brook (including its associated stream corridor) adjacent to and downstream of the site. The fate and

effects of each of these COPCs will be further discussed in the ecological risk assessment.

3.0 TECHNICAL APPROACH

3.1 Data Requirements and Assessment Endpoints

Assessment endpoints are exphcit expressions of the actual environmental values (e.g., ecological resources) that are to be protected. Valuable ecological resources include those without which ecosystem function would be significantly impaired, those providing critical resources (e.g., habitat), and those perceived as valuable by humans (e.g., endangered species and other issues addressed by legislation). Appropriate selection and definition of assessment endpoints are critical to the utility of a risk assessment as they focus risk assessment design and analysis. In general, the assessment endpoints selected for the site are aimed at the viability of terrestrial and aquatic populations and organism survivability.

3.1.1 Assessment Endpoint #1: Protection of the structure and function of the stream.

The overall fimctioning of the stream communities in the Bound Brook will be inferred through the evaluation of assessment endpoints 2, 3 4, 5 and potentially 6. These components provide information regarding the trophic levels and habitats associated with site wetlands and subsequently offer insights into the overall fiinctioning of the habitat.

3.1.2 Assessment Endpoint #2: Protection of the structure and fimction of the stream corridor (inclusive of associated flood plains and wetlands).

The overall functioning of the Bound Brook stream corridor will be inferred through the evaluation of assessment endpoints 2, 3 4, 5 and potentially 6. These components provide information regarding the trophic levels and habitats associated with site wetlands and subsequently offer insights into the overall functioning of the habitat.

3.1.2 Assessment Endpoint #3: Protection of fish recruitment in the stream

Fish at various trophic levels (bottom feeders, predatory fish, and forage fish) will be collected from the bound brook adjacent to and downstream of the site utilizing a variety of electro-shocking, trapping, and netting techniques. After collection, gross necropsies will be performed and standards metrics will be obtained for all fish.

All fish (except forage fish) will be divided into edible and inedible portions and analyzed for PCBs, pesticides, metals, semivolatiles, and volatiles. Ideally, three species with three replicates per species will be analyzed per location. The data for edible portions of fish will used for human health risk assessment, while the data from the edible and inedible portions may be combined to ascertain total contaminant body burdens. For comparative purposes, species will be selected based the species that can be collected at a majority of the sample stations.

Eight forage fish (of the same species, if possible) will be collected from each of the sample stations. After depuration the fish will be sacrificed and submitted to the laboratory for PCBs, pesticides, metals, semivolatiles, and volatiles analyses. The data obtained will be used to determine if significant levels (compared to the reference area) of CPOCs are being accumulated by the forage fish at each of the sample locations. Body burden levels of the CPOCs in the forage fish will also be utilized in food chain models to evaluate risk to upper trophic level organisms

For all fish species, CPOC body burden levels will be compared to levels in the literature that have been found to cause adverse effects.

3.1.2 Assessment Endpoint #3: Protection of aquatic invertebrate communities

Sediment samples will be collected from four of the sample stations and used for chronic amphipod toxicity testing. Significant differences in survival and growth, between the reference and the site locations will be used to evaluate sediment toxicity to benthic invertebrates. Adverse effects observed during the toxicity tests will be used to evaluate direct effects to other invertebrates that would inhabit the stream and indirect effects to species, such as fish, that would rely on benthic invertebrates for foraging.

Various sampling techniques will be employed to collect crayfish for chemical analysis. Inverted cone wire minnow traps will be baited with raw chicken and deployed at each of the sampling locations and checked periodically. Seining and nighttime spotlighting techniques will also be performed if trapping is unsuccessful. Body burdens in the crayfish will be compared to values in the literature that have been associated with adverse effects.

3.1.3 Assessment Endpoint #3: Protection of amphibian populations, specifically through the protection of embryonic and larval stages.

Embryo and larval stages are critical life history periods for amphibians and other species which share similar life-histories. Examination of the effect of contaminants on amphibians during these stages provides a direct measure of reproductive success and as a measure of recruitment success into the adult population. An attempt will be made to collect amphibian eggs for use in a developmental toxicity test. The results of this test will be used to the acute and chronic effects of contaminants on the population. Additionally, attempts will be made to collect a sufficient number of adult amphibians for tissue analysis.

3.1.4 Assessment Endpoint #4: Protection of pescivorous birds.

Food chain accumulation models for black-crowned night herons and/or green-backed herons using site specific data (sediment, water, frog, crayfish, and/or forage fish concentrations) will be utilized to predict contaminant ingestion rates for these species. These contaminant ingestion rates will be compared to levels (acute and chronic) in the literature using the hazard quotient method.

3.1.6 Assessment Endpoint #5: Protection of onmivorous birds.

Food chain accumulation models for water fowl using site specific data (sediment, water) will be utilized to predict contaminant ingestion rates for these species. These contaminant ingestion rates will be compared to levels (acute and chronic) in the literature using the hazard quotient method.

3.1.7 Assessment Endpoint #6: Protection of insectivorous birds/bats.

An attempt will be made to collect and analyze the accumulation of contaminants in emerging insects. The insects will be collected using a light trap which will be set at dusk and checked the following morning. Analyses of body burden accumulations will then be used in an ingestion based food chain model to determine risk to insectivorous birds and/or bats.

3.1.8 Assessment Endpoint #9: Protection of omnivorous mammals.

Small mammals will be trapped in order to determine tissue concentrations of contaminants of concern. Results will be compared with literature values of known detrimental effects. Animals will be collected from three to five areas of the site, as well as from a reference location.

The small mammal tissue concentrations, along with fish, frog, crayfish, sediment, soil, and surface water concentrations will be used in a food chain accumulation model for a raccoon and/or fox. The model will estimate contaminant ingestion rates and these rates will be compared to contaminant ingestion rates in the literature that have been associated with adverse effects.

All field trapping activities will be conducted in accordance with ERT/REAC Standard Operating Procedure SOP #2029, *Small Mammal Sampling*.

Snap traps and live traps will be set in grids located within each of the trapping areas, with the objective of trapping 8 animals of a single species for analysis. These areas will each measure approximately 1 acre in extent. The most abundant species trapped will be chosen for analysis, unless a more sensitive indicator species is caught in sufficient numbers for analysis. Trapping will be conducted over a maximum of three nights per area, and will be curtailed as soon as the trapping objectives are reached. Additional traps will be set in a reference area with comparable habitat to the site areas trapped.

Once the traps are set, they will be checked twice daily in the field, during early morning and early evening hours and potentially more frequently given the presence of fire ants in the area. Recovered animals will be labeled and stored on wet ice in coolers before processing.